Chapter 2
Framework for Implementing Extended Reality in Agricultural Education

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ABSTRACT

The agricultural industry faces climate change, resource limits, and demand for eco-friendly food systems. Traditional agricultural education is important, but it may not capture real-world complexity. This research prepares agricultural education for Extended Reality (XR). Mixed, augmented, and virtual reality are

DOI: 10.4018/979-8-3373-2797-6.ch002

examples. Augmented reality (XR) creates immersive, interactive, and contextually rich learning experiences that connect theory and practice. The framework promotes student engagement, infrastructure, teacher training, curriculum integration, and evaluation. A new breed of tech-savvy agricultural professionals focused to field sustainability is intended. XR-assisted and hybrid learning approaches boost knowledge and skills above conventional ways. Analytical contrasts demonstrate. Real-time diagnostics, scenario-based learning, and smartphone augmented reality might democratize high-quality agriculture education in poor and rural areas. This article outlines how to use XR's revolutionary power to scale, access, and prepare agricultural instruction.

1. INTRODUCTION

In farming, new ideas and old ways of doing things have always been combined. This characteristic has always been present. People have gone from surviving off the soil to learning about issues via science, and the growth of agricultural practices shows this. You can see this transformation in how people utilize hand tools for precision farming. In today's world, when the digital revolution is changing every element of business, agriculture education has to expand swiftly. Extended Reality (XR) is a comprehensive word that includes Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR). More and more people are using these technologies. This stage is a key step in the technology's growth (Chang et al., 2013). These technologies let you study in ways that are both immersive and participatory. They might revolutionize how future farmers and agricultural professionals learn, recall, and utilize knowledge in situations that are like those in the real world. XR technology opens up a whole new world of possibilities in agriculture, where learning is based on hands-on experience and the environment. They make fake places that seem like disease outbreaks, crop cycles, machinery operations, and real-life agricultural situations in a safe and easy-to-reach setting. All of this takes place in a place that looks like these places. Figure 1 of the Virtual Learning Environment architecture indicates that three things need to work together for an XR education plan to function. This framework was created by the Virtual Learning Environment. There are three aspects to it: Agricultural Determinants, Curriculum Development, and Facilitating Conditions (Carruth et al., 2020).